



Introduction to Engineering Graphics

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- **Mathematics**
- **Drawing, Sketching**

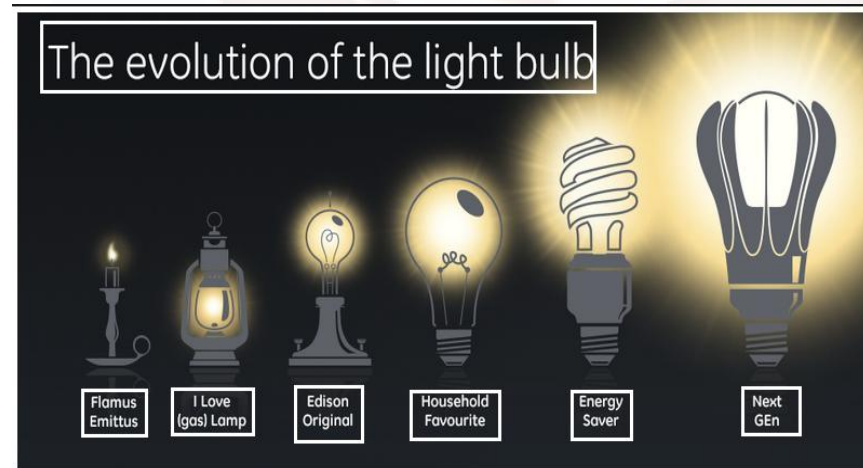
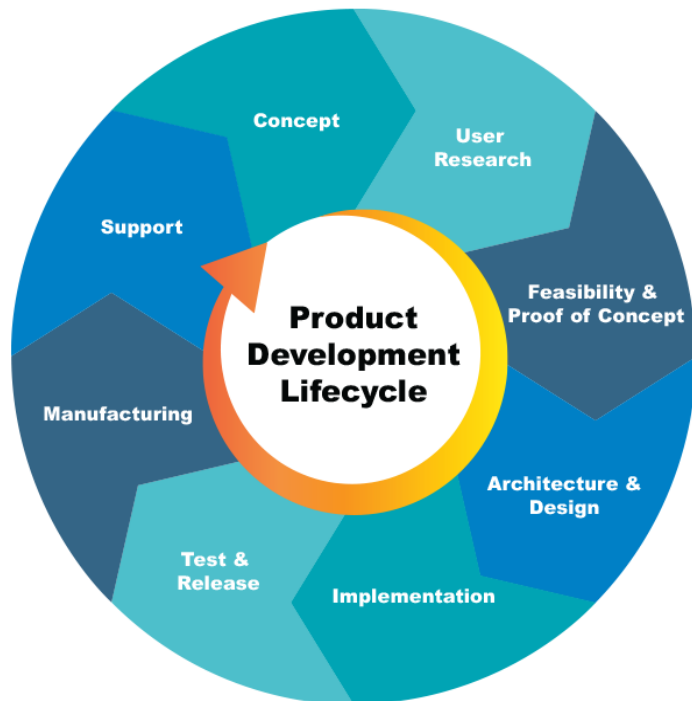


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To acquire knowledge about:

- ❖ Introduction to Product Design
- ❖ Engineering Graphics in Design Process
- ❖ Drawing /Graphics vs. Engineering Drawing/Graphics
- ❖ Drawing Instruments & Materials
- ❖ Drawing Standards
- ❖ Drawing Sheets
- ❖ Layout of Drawing Sheets
- ❖ Drawing Scales
- ❖ Drawing Pencils
- ❖ Types of Lines
- ❖ Units of Measure
- ❖ Dimensioning

- Deals with the conversion of ideas into reality in the form of product .
- Aims to fulfill human needs
- Product development is set of activities beginning with the perception of market opportunity and ending in the production , sale and delivery of product



Engineering Graphics In Design Process

Visualize

Problem identification
& exploration of ideas

Visualization
is the ability to mentally
picture things that do not
exist

Sketches

Draw , design and
record initial ideas

Communication
the design solution
should be communicated
to others without
ambiguity

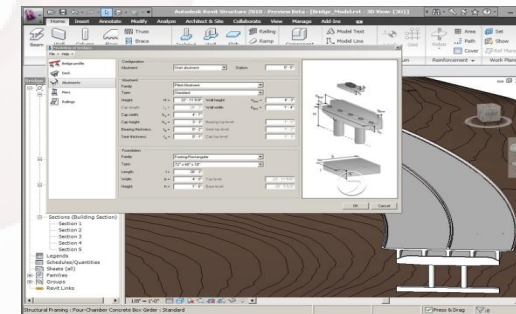
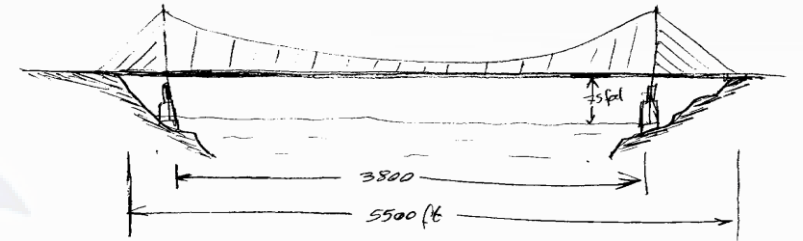
Geometric model

Created from sketches
used or analysis

**Detail drawings
&
3D model**

Refine, optimize
& record the precise
data for production
process or
implementation

Documentation
permanent record of the
solution



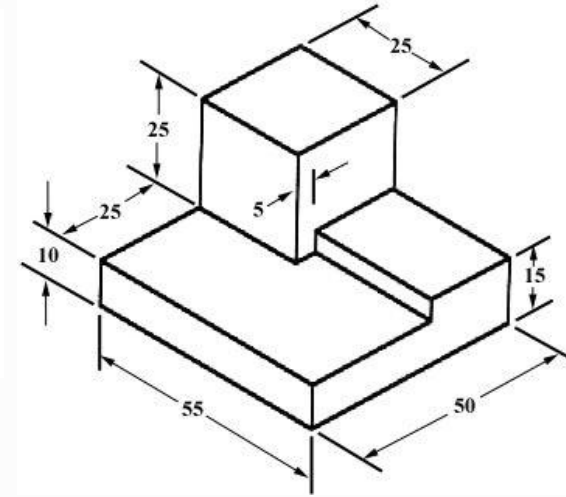
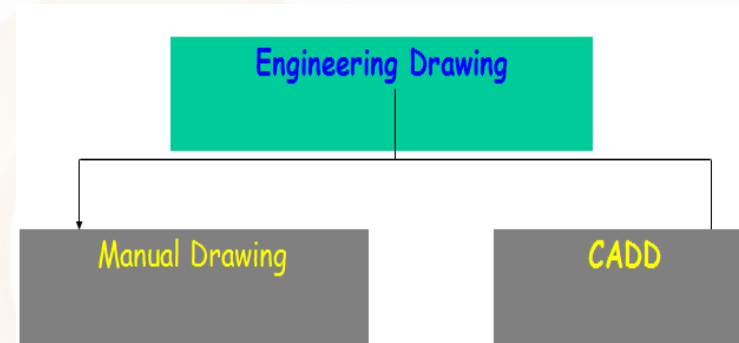
Drawing /Graphics vs. Engineering Drawing/Graphics

Drawing

- ❖ Describing any object/ information diagrammatically
- ❖ Graphical representation of an object

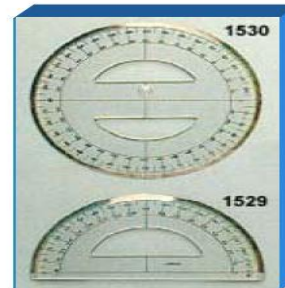
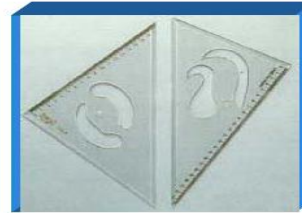
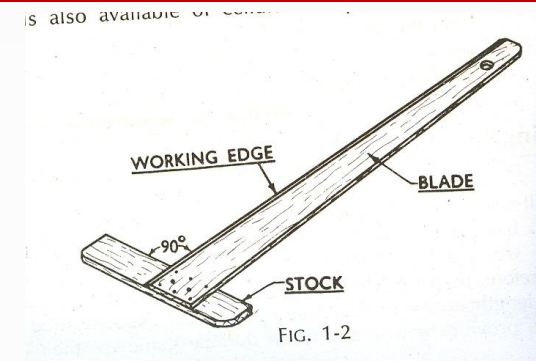
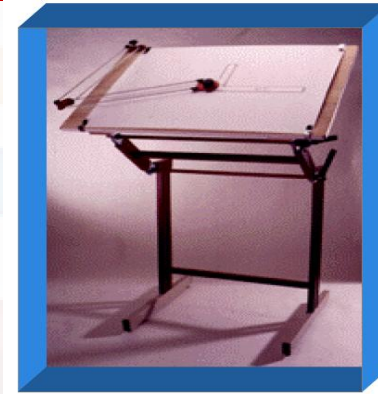
Engineering Drawing

- ❖ Graphical means of expression of technical details without the barrier of a language.
- ❖ Universal language for engineers
- ❖ A drawing of an object that contains all information like actual shape, accurate size, manufacturing methods, etc., required for its construction.
- ❖ No construction/manufacturing of any (man -made) engineering objects is possible without engineering drawing.



Drawing Instruments & Materials

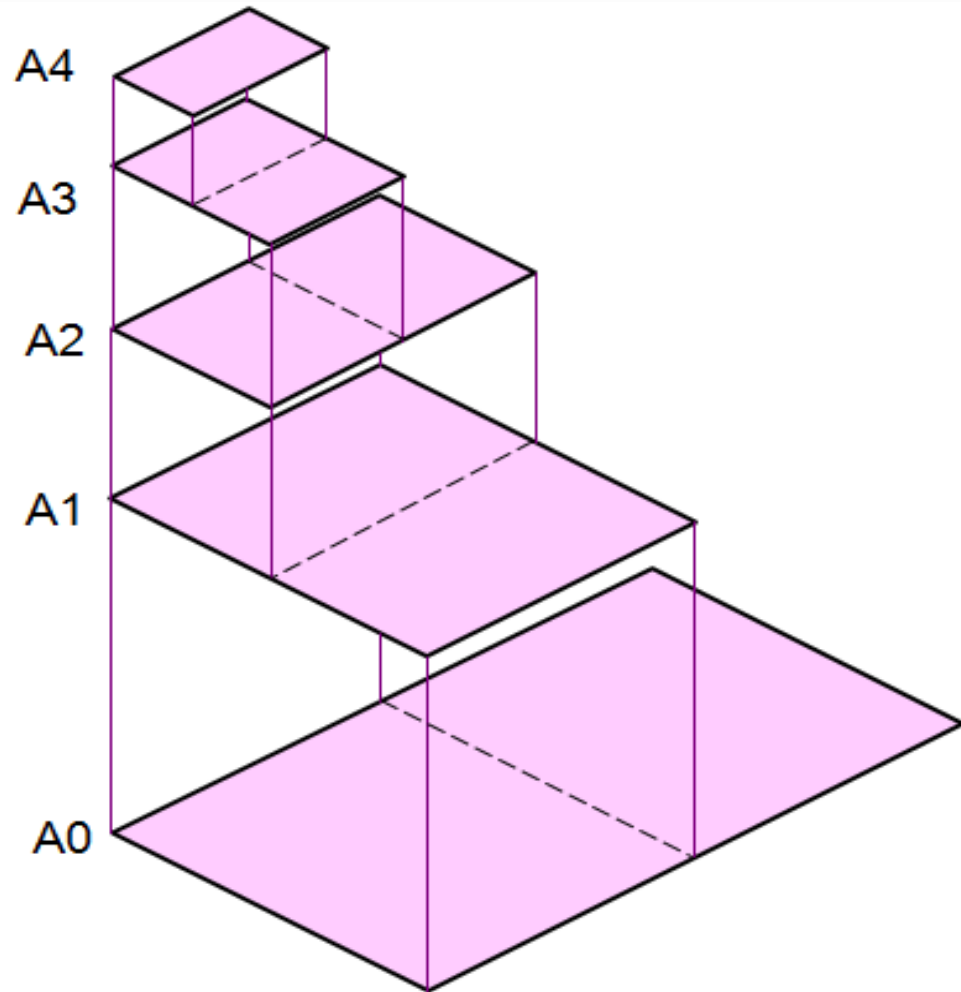
- Drawing board
- Drawing sheet
- Mini-drafter/drafting machine/ T- square
- Instrument box containing compass, divider, etc.
- Scales
- Protractor
- French curves
- Drawing pencils
- Eraser
- Drawing clip/pin/adhesive tape
- Sharpener
- Duster



- ❑ Drawing standards are *set of rules* that govern how technical drawings are represented
- ❑ Drawing standards are used so that drawings *convey the same meaning* to everyone who reads them.

Standard Code

Country	Code	Full name
USA	ANSI	American National Standard Institute
Japan	JIS	Japanese Industrial Standard
UK	BS	British Standard
Australia	AS	Australian Standard
Germany	DIN	Deutsches Institut für Normung
	ISO	International Standards Organization



- Trimmed paper of a size A0 ~ A4.

- Standard sheet size (**JIS**)

A4 210 x 297

A3 297 x 420

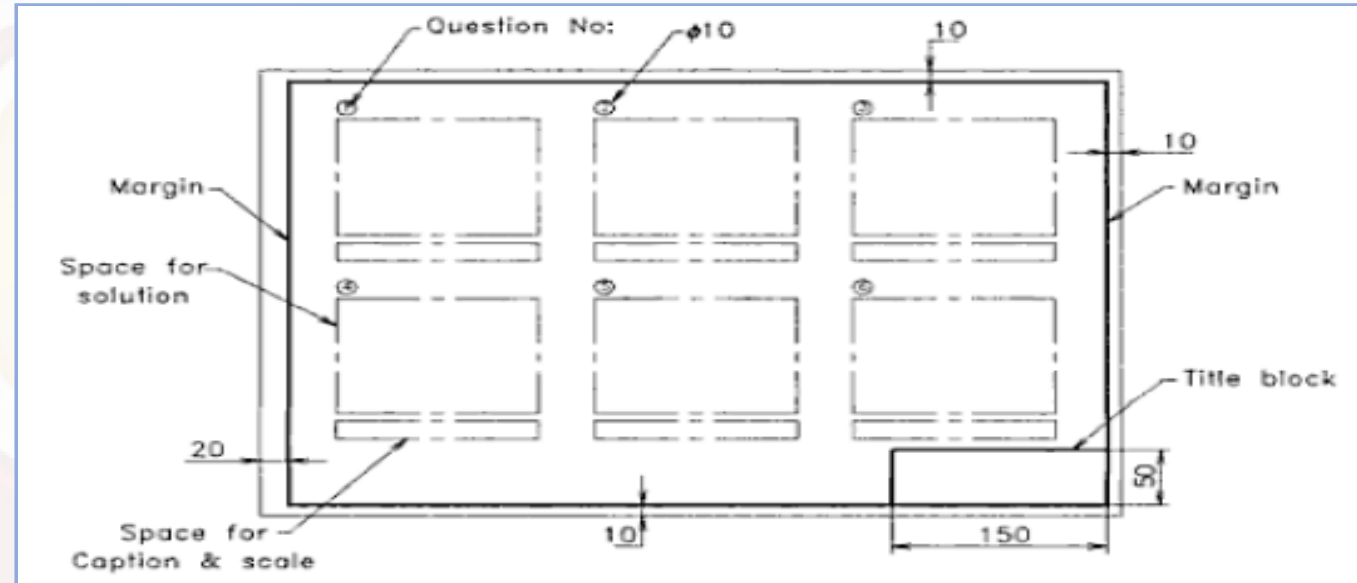
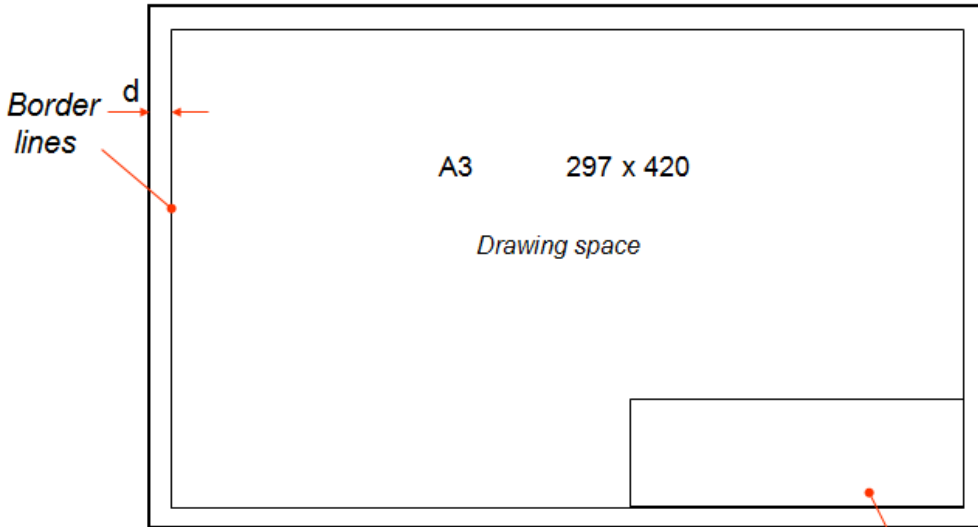
A2 420 x 594


A1 594 x 841

A0 841 x 1189

(Dimensions in millimeters)

Layout of Drawing Sheets



<div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></div> </div>	NAME OF STUDENT		TITLE OF DRAWING	
	CLASS:	DWG. NO:	SCALE:	
	ROLL NO:	GRADE:		
	DATE:	VALUED BY:		
	50	50	50	

➤ **Scale** is a ratio between the linear dimension of a drawn representation of an object and the actual object.

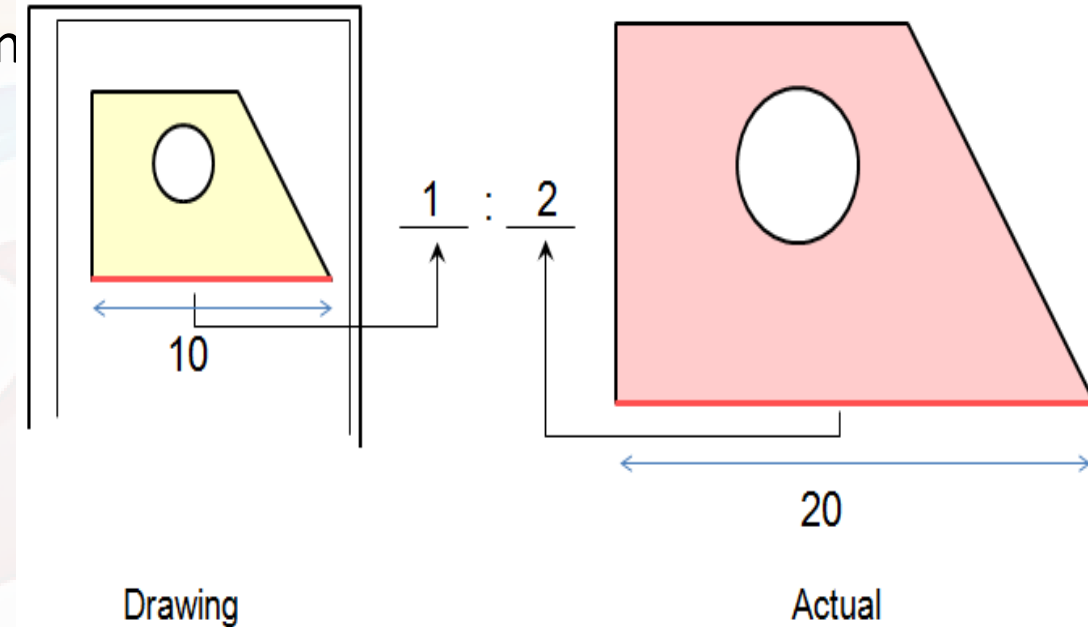
➤ Designation of a scale consists of the word “SCALE” followed by the indication of its ratio, as follows

SCALE 1:1 for full size

SCALE **X**:1 ($X > 1$) for an **enlargement** scales

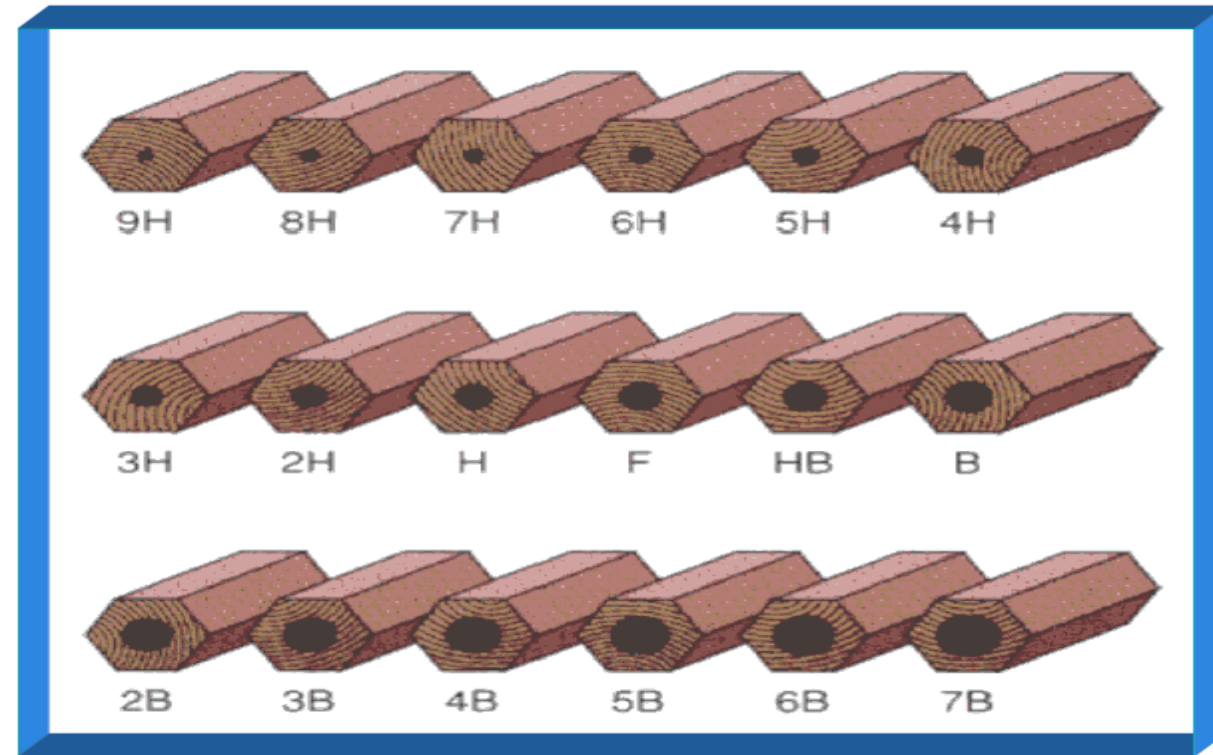
SCALE 1:**X** ($X > 1$) for a **reduction** scales

- Drawing scale is commonly found in a title block
- Standard reducing scales are: 1:5, 1:10, 1:20, 1:50, 1:100
- Standard enlarging scales are: 2:1, 5:1, 10:1, 20:1, 50:1, 100:1



Drawing Pencils

- ✓ **Wooden pencils** – are graded and designated by numbers and letters
- ✓ **Mechanical clutch pencils** – **Not allowed**
- ✓ • 7B, 6B, 5B, 4B, 3B, 2B, B - in decreasing order of softness and blackness
- ✓ • **HB** to F – Medium grade
- ✓ • **H, 2H, 3H, 4H, 5H, 6H, 7H, 8H, 9H** – increasing order of hardness
- ✓ Drawings are done using 2H pencils and finished with H and HB pencils – to be practiced in this course.



Types of Lines









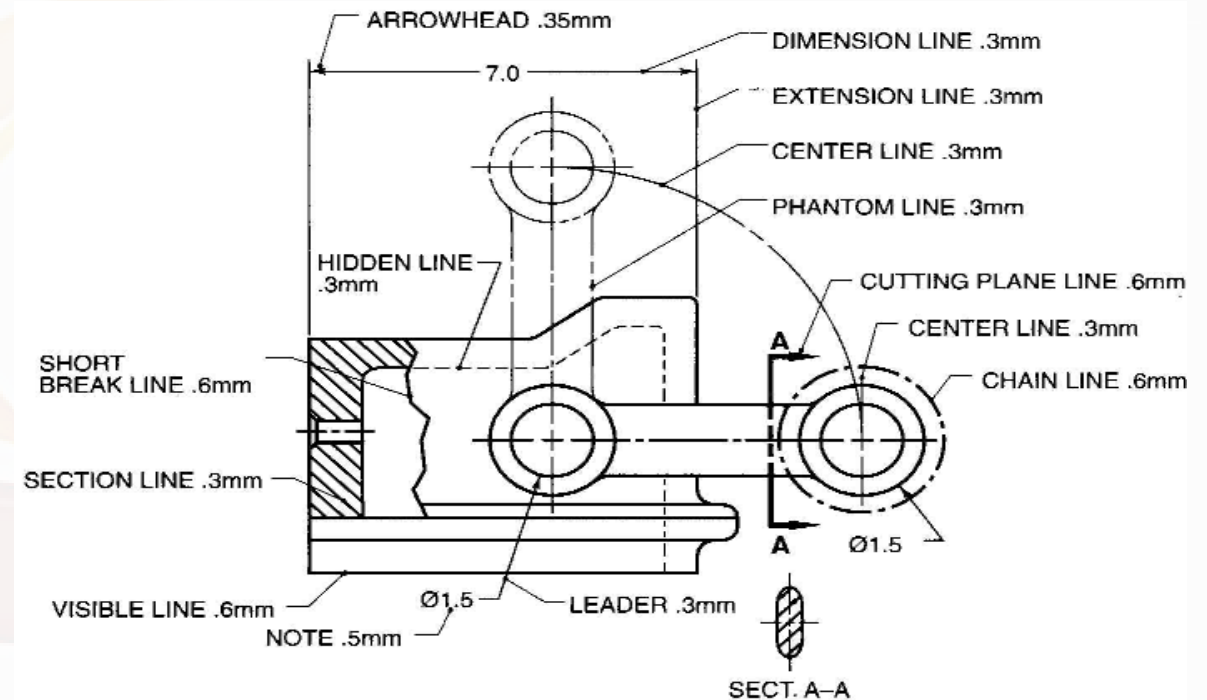
Illustration	Application	Pencil
Thick 	Outlines, visible edges, surface boundaries of objects, margin lines	H
Continuous thin 	Dimension lines, extension lines, section lines leader or pointer lines, construction lines, boarder lines	2H
Continuous thin wavy 	Short break lines or irregular boundary lines – drawn freehand	2H
Continuous thin with zig-zag 	Long break lines	2H
Short dashes, gap 1, length 3 mm 	Invisible or interior surfaces	H

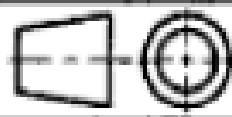
Illustration	Application	Pencil
Short dashes 	Center lines, locus lines Alternate long and short dashes in a proportion of 6:1,	2H
Long chain thick at end and thin elsewhere 	Cutting plane lines	H / 2H
Continuous thick border line 	Border	HB



- International systems of units (SI) – which is based on the meter.
- **Millimeter (mm)** - The common SI unit of measure on engineering drawing.
- Individual identification of linear units is not required if all dimensions on a drawing are in the same unit (mm).
- The drawing shall however contain a note:

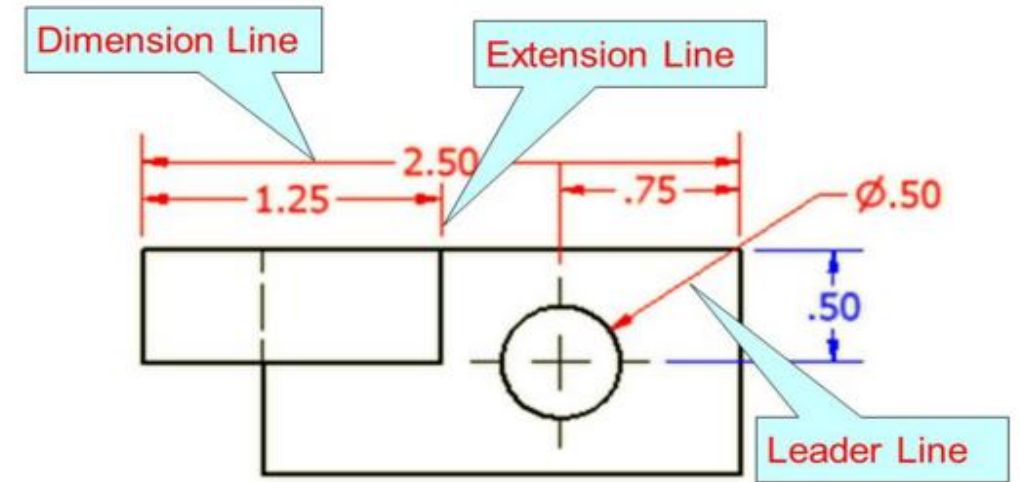
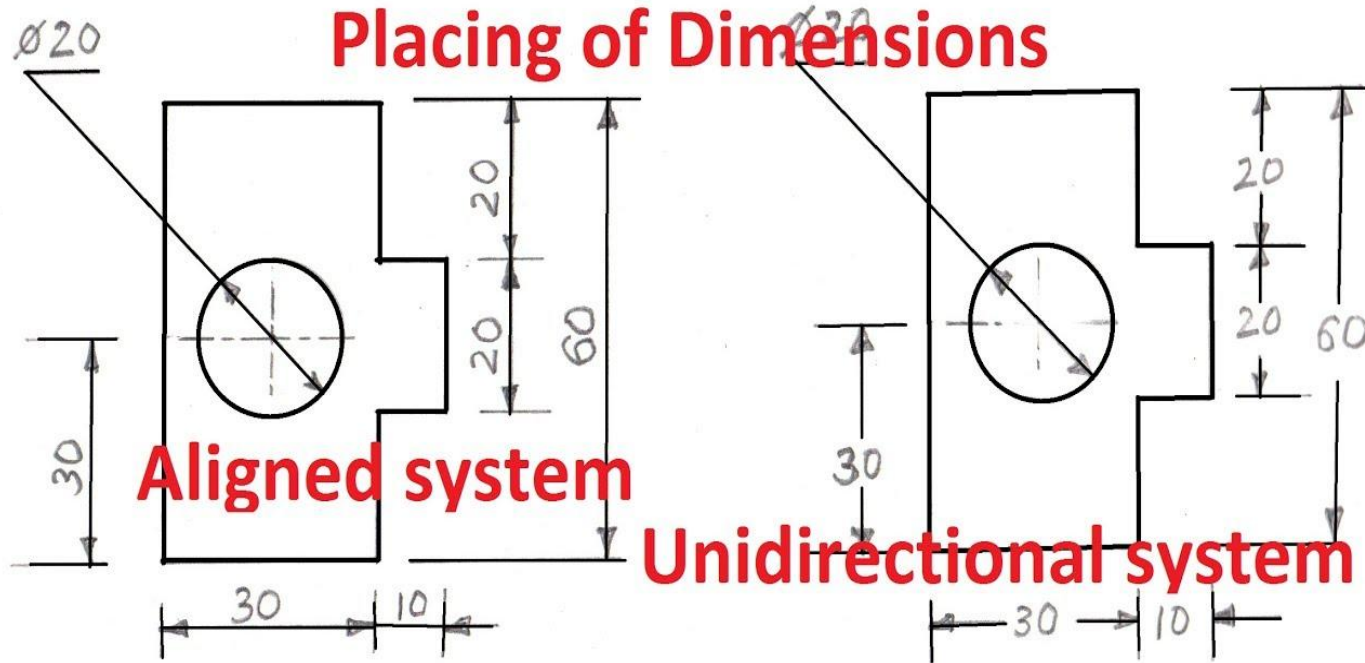
ALL DIMENSIONS ARE IN MM. (Bottom left corner outside the title box)

ALL DIMENSIONS ARE IN MM

20 10 10 10	NAME OF STUDENT	TITLE OF DRAWING	
	CLASS:	DWG. NO:	SCALE:
	ROLL NO:	GRADE:	
	DATE:	VALUED BY:	
	50	50	50

❖ **Dimensioning of an object** is accomplished by dimensioning each element to indicate **its size (size dimensions)** and **relative location (location dimensions)** from a center line, base line or finished surface.

Placing of Dimensions



- An engineering drawing helps to convey ideas and convert concepts into reality
- An engineering drawing follows criteria and conventions to eliminate confusion by the standardization of nomenclature and practices, as a way to clearly relay the information to the individual who understands it when it is read, and very importantly, it indicates or hints how something is going to be manufactured.

- ❖ How do you explain engineering drawings?
- ❖ What are the 4 basic components of dimensioning in engineering drawing?
- ❖ Is Representative Factor (RF) and Scale Factor same?

- **Engineering Drawing by N. D. Bhatt and V. M. Panchal**
- **Engineering Graphics by K. C. John**
- **NPTEL**



Thank You

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